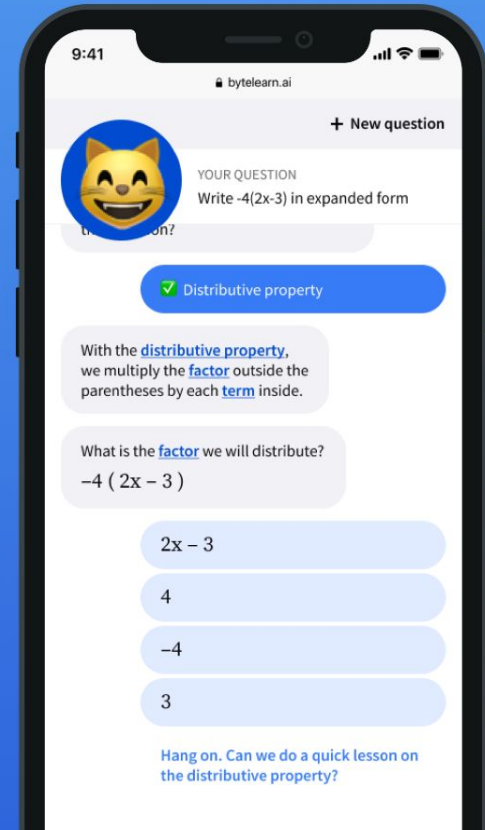


Designing the ByteLearn Student Experience

ByteLearn is an AI powered teaching assistant that gives students step by step targeted help on Math problems and empowers teachers with insights into the class's top learning gaps.



Introduction

Role

UX Designer and Researcher

Delivered

Customer insights deck
Usability test report
First hi-fi prototype

Team

Head of Design, UI Designer

Results

Decks presented to investors secured \$9.5M in seed
Improved conversation flow
Learning math is less painful

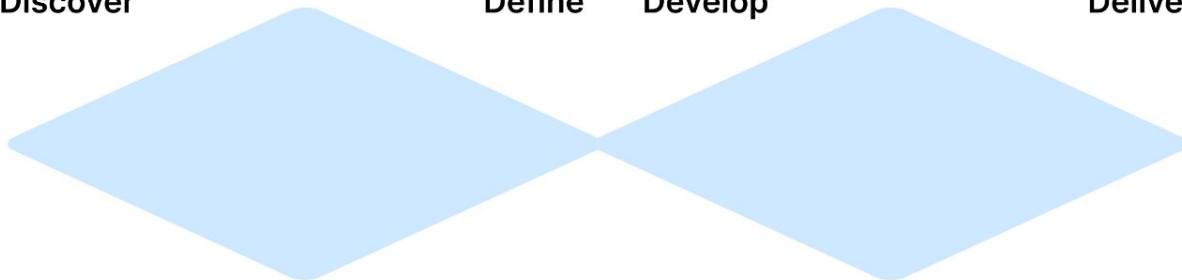
My Process

Discover

Define

Develop

Deliver



The Problem

How might we design an online teaching assistant that helps students *learn* math and stay motivated?

7M

Internet math queries

Chegg
Answers
Process



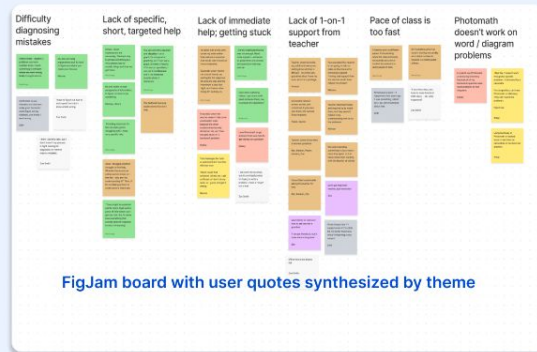
Motivation

Quotes

"I hate Math. I just want to do well in school. My teacher shames me for asking for help. I've lost a lot of confidence.

If I know I'm not good at math, I'm not going to be motivated to do better.

When math seems really hard, I just need someone to break down the process."



Discover: Survey Design

L0 / L1 students have high baseline pain that makes them disengage from math

L2 / L3 students can have a wider set of pains because they have not disengaged from math

		Math proficiency →								
			L0	L1 / L2	L2	L2	L2	L3	L3	
	Pain	Avg	Kiernan	Zoe	Ben	Zoe S.	Ruby	Paden	Mariana	
4	Difficulty with harder test questions	3.9	N/A	2	5	4	4	4	4	
5	Difficulty getting started with a problem (strategic competence)	3.8	3	2	5	5	4	4	4	
6	Lack of immediate right / wrong feedback	3.6	N/A	4	5	5	4	4	3	
7	Lack of answers / explanations for test prep problems	3.3	N/A	5	5	3	4	3	4	
8	Lack of 1-on-1 support from teacher	3.5	4	3	5	5	3	4	4	
9	Lack of immediate help (getting stuck)	3.4	5	1	5	5	3	5	5	
10	Lack of effective ways to learn concept (conceptual understanding)	3.4	4	4	5	5	2	3	3	
11	Difficulty diagnosing mistakes	3.3	2	2	4	5	4	4	4	
12	Lack of short, targeted help	3.2	5	1	5	4	3	5	5	
13	Interacting with math is painful (productive disposition)	3.1	5	5	5	3	2	2	3	
14	Lack of emotional support from teacher	3.1	2		5	5	3	4	4	
15	Long-term math demotivation / powerlessness, "I can't wait to be done with math"	3.2	5	5	4	4	2	2	2	
16	Stress from homework being graded for accuracy	3.0	4	4	N/A	N/A	1	N/A	N/A	
17	Need to simulate test conditions	3.0	N/A		3	3	1	3	4	
18	Outsized penalties for silly mistakes	2.9	3	3	4	3	2	4	2	
19	Lack of step-by-step procedural help	2.9	5	2	5	4	0	4	3	

Discover: Student Pain Points



Personalized learning

- Lack of immediate help
- Lack of 1-1 teacher support
- Lack of targeted help
- Diagnosing mistakes



Cognitive learning














- Step by step procedural help
- Difficulty starting questions
- Learning new concepts
- Lack of immediate feedback



Affective learning

- Pain of getting stuck
- Lack of support from teacher
- Appearing stupid
- Wanting to avoid mistakes

Define: Segmentation - Proficiency

	L0: Powerless	L1: Difficulty w basics	L2: Difficulty w complex	L3: Advanced	L4: Highly Capable
Agency	Very low "Can't do math"	Low "Not good at math"	Medium "Math is not my strong suit"	High "I like Math"	Very high "Math is easy"
Primary goals	Avoiding math	Doing what's required for class, but minimizing engagement with math	Putting in effort if needed to do well on tests	Developing solid math proficiency, understanding everything needed to succeed in class	Enjoying learning math, developing a very solid understanding
Students	 Kiernan	 Zoe T.	<div>   </div> <div>   </div> <div>  Ruby </div>	<div>   </div> <div>  </div>	<div>   </div> <div>  Araily (Level 4/5) </div>

Define: User Profiles



“

I don't mind struggling. I enjoy Math most when I am able to learn a concept - especially a difficult one.

Mariana Chavez

11th Grade | L3 Math
16 yrs | Hispanic | Torrance, CA

Motivated Mariana

Logline

Highly motivated, self-sufficient and resourceful student. Attends private high school. Favorite subject is CS. Has founded women in STEM club. Has an impatient teacher who doesn't support her or give her sufficient resources. Conscientious and studies on her own- mock tests simulating test environment, extra questions from textbook. When stuck, asks sister or goes on slader for immediate help, otherwise tutor.com.

Pain Points

1. Lack of practice questions for test prep
2. Lack of immediate in-person support
3. Lack of short, targeted help
4. Difficulty getting started with a problem
5. Difficulty diagnosing mistakes

Pain factors

1. Needs to work to achieve desired grade
2. Has instant support from tutor.com, can get help from sister (math major)
3. Math class is moderately challenging
4. Teacher is impatient and provides limited support
5. Wants to develop math fluency for academic success

Define: User Profiles

Discouraged Ben

Logline

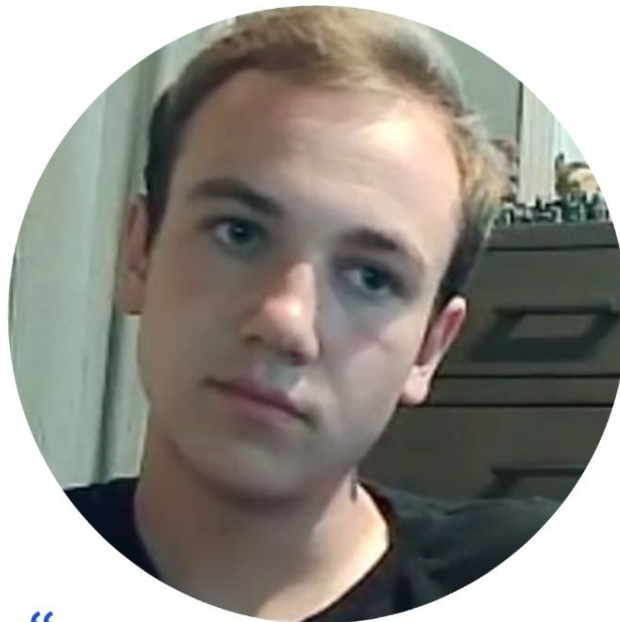
Math is highly painful. Used to be good at it and was in advanced, until 8th grade when he got a terrible teacher. Tries to be a good student but has lost all confidence after being shamed in class for having a tutor and asking questions. He can solve problems they've gone over in class but struggles with harder questions that show up in tests. Doesn't know how to study. Gap in foundations. Doesn't have basic conceptual understanding of topics.

Pain Points

1. Good grade is very difficult to achieve - gap between what is covered vs. what is tested
2. No support from teacher - emotional + cognitive (concepts & test prep)
3. Need for and availability of instant support, primarily human
4. Lack of timely feedback on homework and tests
5. Highly challenging fast paced classroom environment

Pain factors

1. Struggling to earn the grade he wants
2. Has a weekly tutor, but no instant help
3. Math class is extremely challenging, with very difficult tests
4. Teacher does not provide the support necessary for students to succeed
5. Doesn't really want math proficiency, but needs it to succeed in this class



“

I hate Math. I just want to do well in school. My teacher shames me for asking for help and having a tutor. I've lost a lot of confidence.

Ben Williams

12th Grade | L2 Math
17 yrs | White/Caucasian | Novato, CA

Define: Product Opportunities

Based on our findings identifying key areas of pain, we identified 3 core product opportunities



1-1 immediate tutoring

- Instant, targeted tutoring
- Instant feedback
- Setting up problems
- Reduces burden on teacher to attend to every student's needs



Targeted step by step help

- Step by step “solve with me” procedural learning
- Real learning, not just answers
- Learning new concepts
- Additional practice for new skills - no need to ask someone for help



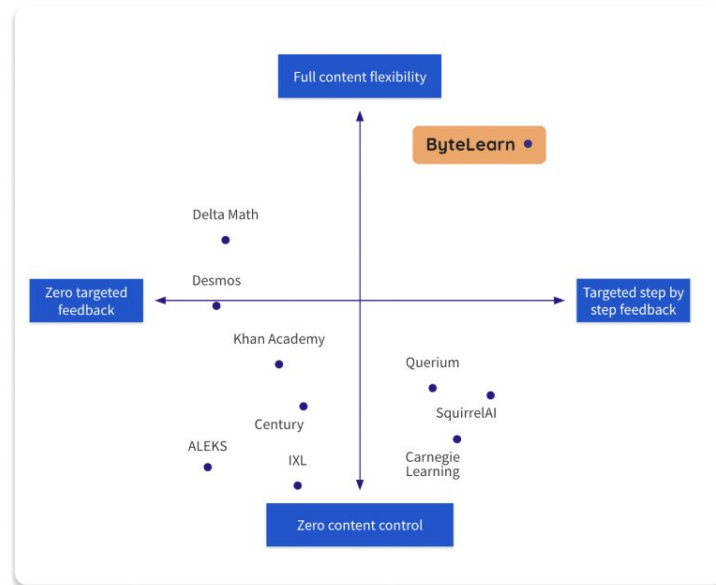
Friendly, fun, forgiving

- Positive, no-judgement
- Penalty free support
- Celebrates mistakes and minimizes pain
- Wanting to avoid making mistakes

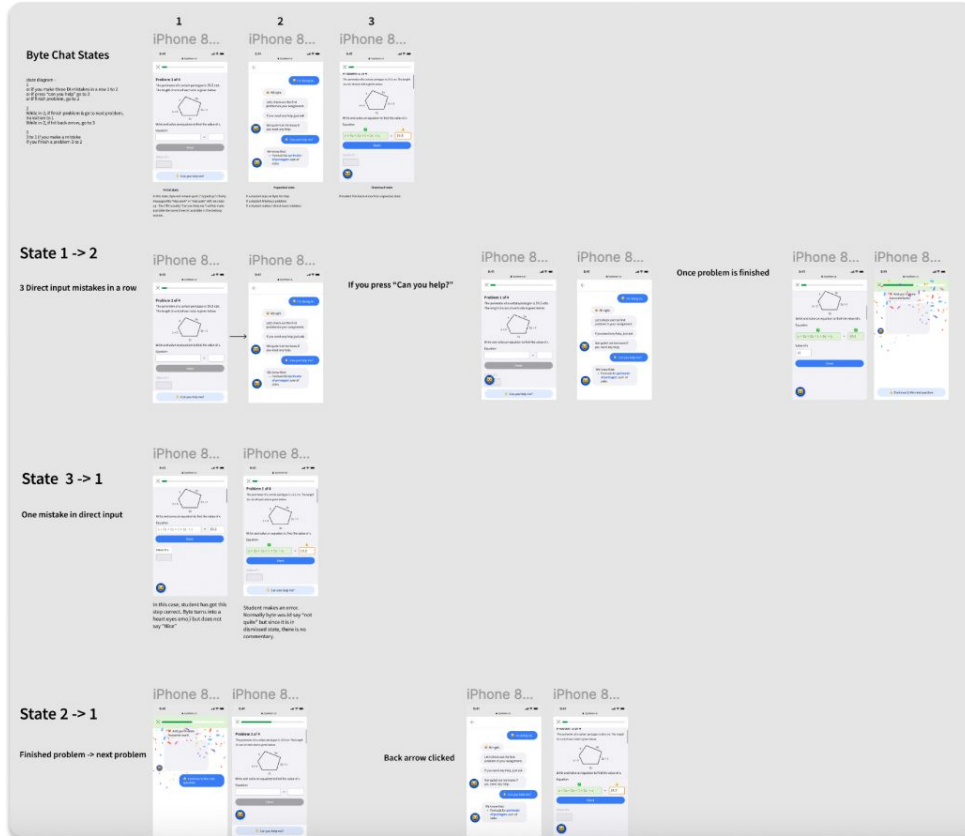
Define: Competition

ByteLearn provides students with **real time, targeted step-by-step feedback** and teachers with **full content control**.

		Student-paced practice with AI				Student-paced practice w/out AI		Online curriculum/practice problem				ByteLearn
		SquirrelAI	Century	Querium (Rover)	Carnegie Learning	ALEKS	Khan Academy	Desmos	Delta Math	Formative	IXL	
Real-time feedback	Step-by-step, guided problem solving	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
	Conversational, friendly chat style	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✓
	Targeted, 1-1 help	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
	User input-dependent hints	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
Differentiated learning	AI recommended content based on knowledge graphs	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
	Personalized prep for classroom tests	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
	Actionable insights & clear next steps	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓
Content flexibility	Supports teacher-generated problems	✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✓
	Customization of individual problems	✗	✓	✓	✗	✗	✗	✓	✗	✓	✗	✓
	Comprehensive content library	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓



Develop: Flows and Edge Cases



Q. What if the student needs to look at a problem and talk to Byte?

A. Gestural interactions

Chat states:

1. Initial State
2. Expanded State
3. Dismissed State

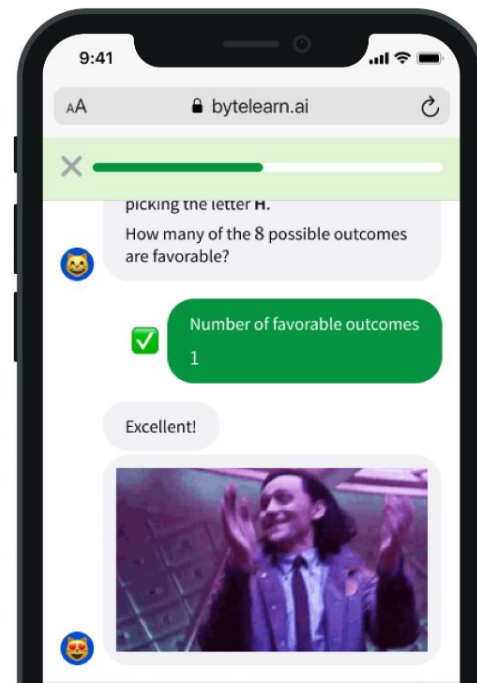
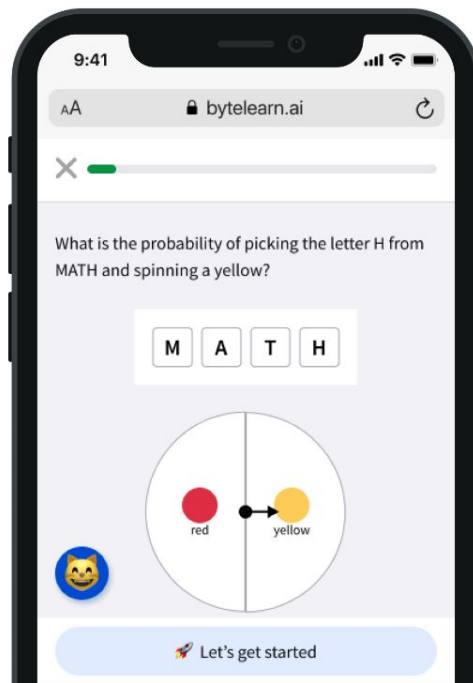
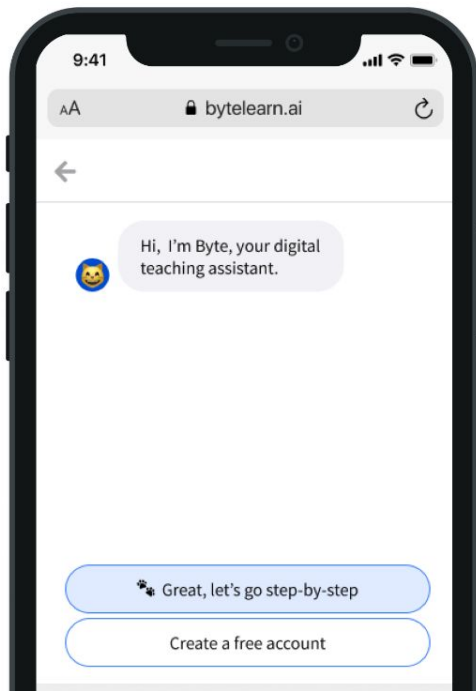
Develop: Prototype

Step by step chat interface that students are already familiar with. Students can select the next step they want to take.

Simple, intuitive and clean workspace, inspired by KhanAcademy and Desmos.

Byte is available for help as and when the student needs - only a tap away!

Instant feedback given by clear chat states and emojis.
GIFs and positive messaging to motivate and support students



Validate: User testing

Based on our 12 user tests, we compiled a chart of all the pros and cons to inform our core product features.

Feature	Pros	Cons
Chat	<p>"It feels less intimidating to tell an AI I don't understand something."</p> <p>I like that it's friendly and not judgmental about getting it wrong.</p> <p>I like that it gives positive feedback, especially when you do better</p> <p>I like that it asks how you're doing.</p>	<p>Teacher input- Some kids don't get this phone interface until they are older (12-13 yrs)</p>
Step-by-step	<p>Step-by-step has advantages over Khan Academy/IXL, breaks it down</p> <p>Multiple choice scaffolding</p> <p>Unless incentivized, many students will just use Brainly or Photomath (Steph)</p>	<ul style="list-style-type: none">• There might be potential points where I just want a piece of information but I get the chat.• How is this going to progress for multi-step complicated problems?• Seeing the process instead of seeing the steps
Concise explanations	<p>"No one wants to read paragraphs of information to figure out how to do something"</p>	<p>Need to know the process and context, otherwise it's just words to me.</p>
Visual elements	<p>GIF and congrats confetti</p> <p>Chat w/emojis makes it less "robotic"</p>	<ul style="list-style-type: none">• Emoji's may be too much. Neutral emojis may be better.• Simplistic interface for older kids.• The cat is weird

Students Said

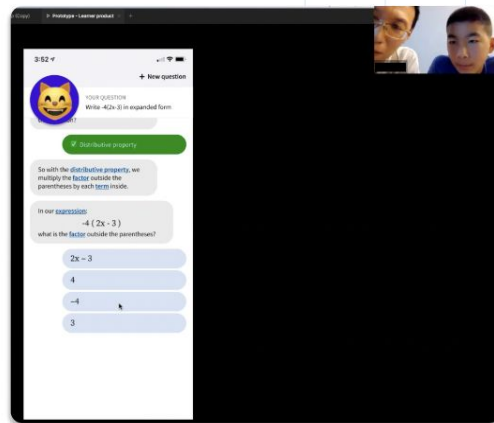
“ByteLearn is more **supportive** [than Edulastic], and you can see your answers along the way.”

“ByteLearn is more **fun and more engaging**. [Edulastic] is just straight math and no fun.”

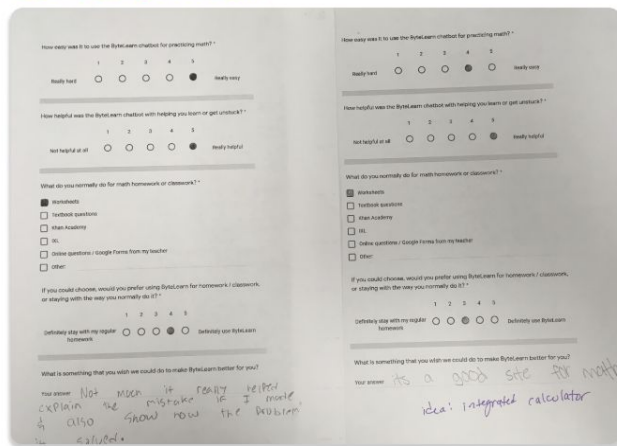
“I’d choose ByteLearn too. It **feels more human**, like it’s actually talking to you. It was nice to have someone ask about your day.”

Student enjoyed the **GIFs as a reward** and feel they can cover a wider range of themes, they could just be funny

Students like the **chat format**, it feels less formal, and they’re comfortable scrolling back if needed



User testing on Zoom



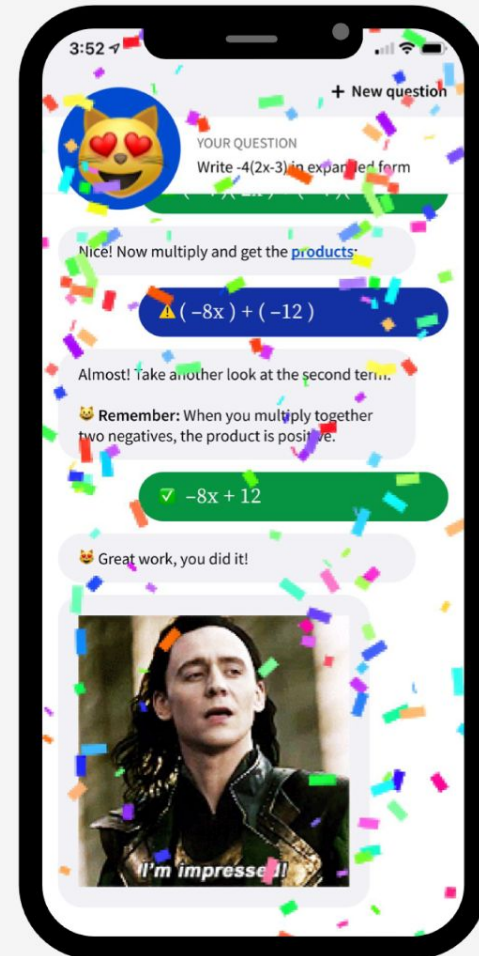
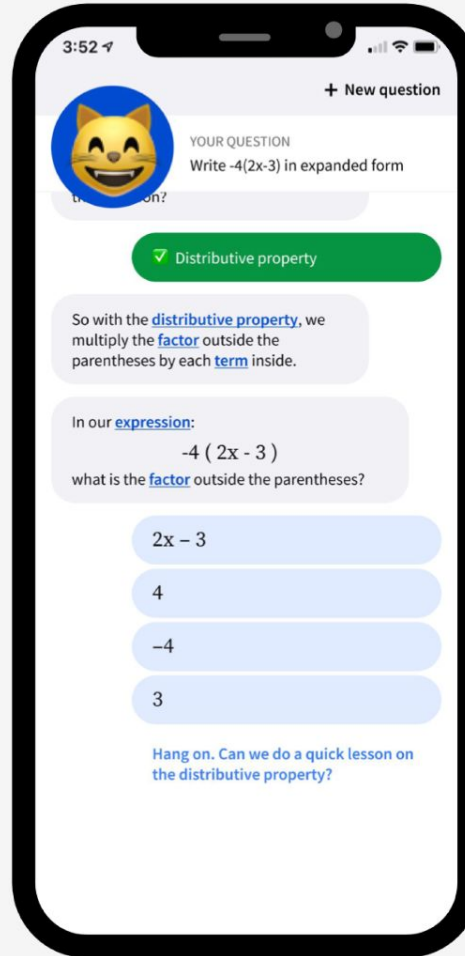
Surveys filled out by students

Deliver: Solution

- GIFs and emojis heightened the congratulatory moment
- Clickable definitions to remember terminology.
- Input dependent hint as just-in-time bite sized lessons
- Intext calculator

Features for Stage 2:

- Whiteboard for drawing on the problem
- Ability to have a voice read out the chat



Impact and Reflection

100%

felt supported

92%

would use ByteLearn

\$9.5M

seed funding secured

Through constant **user feedback** and **rapid prototyping** we were able to make quick product decisions

Challenges and Learnings

- Communicating with engineering team - benefit of Trello and Jira!
- Getting scammed on user testing sites - the importance of screeners!
- Determining priorities for various tasks - cultivating honest relationships!



Questions?

Launches Summer 2022

